



Government Gazette Staatskoerant

REPUBLIC OF SOUTH AFRICA
REPUBLIEK VAN SUID-AFRIKA

Vol. 443

Pretoria, 10 May
Mei 2002

No. 23399

PART 2 OF 2



AIDS HELPLINE: 0800-0123-22 Prevention is the cure

Specific Outcome 2.4 Use a variety of standard and non-standard measures of distance, length, capacity and mass to estimate, compare and measure in everyday problem contexts.

3. Title: Extract and use information derived from simple tables and organize information into tables

Specific Outcome 3.1 Extract and record information from simple mathematical tables.

Specific Outcome 3.2 Use information derived from tables to answer simple questions related to the tables.

Specific Outcome 3.3 Demonstrate understanding of the use of tables and organise information into simple tables.

4. Title: Manage Personal Finances

Specific Outcome 4.1 Prepare a personal budget

Specific Outcome 4.2 Open a personal bank account

Specific Outcome 4.3 Improves his/her financial situation

5. Title: Engage in a range of speaking and listening interactions

Specific Outcome 5.1 Initiate and maintain conversation

Specific Outcome 5.2 Ask for and give simple information, explanations, directions and instructions.

Specific Outcome 5.3 Make and respond to offers and requests.

Specific Outcome 5.4 Express and respond to opinions and feelings.

Specific Outcome 5.5 Listen and respond critically to oral text.

6. Title: Maintain effective work relationships in a cleaning environment

Specific Outcome 6.1 Communicate effectively with team members

Specific Outcome 6.2 Be a team player

Specific Outcome 6.3 Take pride in his/her work

Specific Outcome 6.4 Take accountability for his/her work

7. Title: Apply quality principles in everyday cleaning tasks

- Specific Outcome 7.1** Identify and understand the importance of quality in the workplace
- Specific Outcome 7.2** Work according to quality principles
- Specific Outcome 7.3** Apply quality management system requirements to his/her work
- Specific Outcome 7.4** Correct problems to improve quality

8. Title: Practise environmental awareness

- Specific Outcome 8.1** Demonstrate an understanding of how the environment works
- Specific Outcome 8.2** Demonstrate an understanding of how pollution / waste impacts on the environment
- Specific Outcome 8.3** Take the appropriate steps to limit pollution / waste in the workplace.
- Specific Outcome 8.4** Dispose of household waste in an environmentally responsible manner

9. Title: Plan and manage time in the workplace

- Specific Outcome 9.1** Make sure that s/he understands precisely what is required when instructions are issued to him/her
- Specific Outcome 9.2** Plan the task to be completed
- Specific Outcome 9.3** Carry out the task according to the plan

10. Title: Maintain personal hygiene, health and presentation

- Specific Outcome 10.1** Wash hands effectively
- Specific Outcome 10.2** Practice good hygiene and grooming habits.
- Specific Outcome 10.3** Deal with common health issues to prevent the spread of disease
- Specific Outcome 10.4** Strictly follow hygiene and health requirements in his/her dress code

11. Title: Identify surfaces, soilage and its cleaning procedures

- Specific Outcome 11.1** Identify hard and resilient floor surfaces and the cleaning procedures applicable to it

- Specific Outcome 11.2** Identify above the floor surfaces, soilage and cleaning procedures
- Specific Outcome 11.3** Identify soft and upholstered surfaces and cleaning procedures
- Specific Outcome 11.4** Identify soils in a commercial environment
- Specific Outcome 11.5** Identify cleaning and maintenance procedures for different surface types

12. Title: Deal with customers in a cleaning environment

- Specific Outcome 12.1** Identify customers in the work environment
- Specific Outcome 12.2** Identify the customer's needs and expectations
- Specific Outcome 12.3** Meet the customer's needs and expectations

13. Title: Use chemicals in cleaning procedures

- Specific Outcome 13.1** Understand there is a chemical side to every cleaning job
- Specific Outcome 13.2** Identify soils and cleaning chemicals, in order to remove the soils
- Specific Outcome 13.3** Comply with safety rules and regulations
- Specific Outcome 13.4** Correctly dispose of wastewater and perform end of task duties

14. Title: Handle and store cleaning chemicals

- Specific Outcome 14.1** Select different types of cleaning chemicals
- Specific Outcome 14.2** Handle cleaning chemicals
- Specific Outcome 14.3** Store cleaning chemicals

15. Title: Clean and maintain toilets and urinals

- Specific Outcome 15.1** Prepare for toilet and urinal cleaning
- Specific Outcome 15.2** Determines the condition of a toilet and a urinal
- Specific Outcome 15.3** Clean a toilet and a urinal
- Specific Outcome 15.4** Perform end of task procedures after cleaning toilets and urinals

16. Title: Understand basic cleaning principles and perform basic cleaning tasks

- Specific Outcome 16.1** Identify the components of cleaning

- Specific Outcome 16.2** Get the information needed to do the job that s/he will be paid for
- Specific Outcome 16.3** Prepare for cleaning
- Specific Outcome 16.4** Apply the principles of cleaning
- Specific Outcome 16.5** Perform end of shift duties

17. Title: Wet mop floors

- Specific Outcome 17.1** Prepare to wet mop floors
- Specific Outcome 17.2** Spot mop a floor
- Specific Outcome 17.3** Wet mop a floor using the one-stage method
- Specific Outcome 17.4** Wet mop a floor using the two-stage method
- Specific Outcome 17.5** Perform end of task procedures after wet mopping floors

18. Title: Clean and maintain restrooms and bathrooms

- Specific Outcome 18.1** Prepare for restrooms and bathroom cleaning
- Specific Outcome 18.2** Determine the condition of a restroom and bathroom
- Specific Outcome 18.3** Clean a basin, bath, bidet and shower
- Specific Outcome 18.4** Perform end of task procedures

19. Title: Clean above the floor surfaces

- Specific Outcome 19.1** Prepare for cleaning above the floor surfaces
- Specific Outcome 19.2** Assess the area to be cleaned and plan cleaning activities
- Specific Outcome 19.3** Clean furniture, partitions and fittings
- Specific Outcome 19.4** Clean telephones, ashtrays, waste-paper bins and desk lamps
- Specific Outcome 19.5** Check the quality of cleaning above the floor surfaces

20. Title: Operate a scrubbing /buffing and burnishing machine

- Specific Outcome 20.1** Prepare the scrubbing / buffing and burnishing equipment
- Specific Outcome 20.2** Operate a low- and high-speed machine
- Specific Outcome 20.3** Operate an ultra-speed burnishing machine
- Specific Outcome 20.4** Perform end of operating procedure for scrubbing / buffing and burnishing

21. Title: Identify, collect, classify and handle waste

- Specific Outcome 21.1** Identify, categorize, collect and remove different kinds of waste
- Specific Outcome 21.2** Sort and store waste on site
- Specific Outcome 21.3** Demonstrate an understanding of the economics applicable to recoverable waste

22. Title: Vacuum clean dry surfaces

- Specific Outcome 22.1** Prepare vacuum cleaning equipment and accessories
- Specific Outcome 22.2** Prepare to vacuum a dry surface
- Specific Outcome 22.3** Vacuum a dry surface
- Specific Outcome 22.4** Perform end of task procedures after vacuum cleaning dry surfaces

23. Title: Sweep floors

- Specific Outcome 23.1** Prepare to sweep a floor
- Specific Outcome 23.2** Sweep the floor using a broom
- Specific Outcome 23.3** Sweep the floor using a mop sweeper
- Specific Outcome 23.4** Sweep the floor using a disposable dust sweeping cloth
- Specific Outcome 23.5** Sweep the floor using a walk behind non-motorised sweeper
- Specific Outcome 23.6** Perform end of task procedure for floor sweeping

24. Title: Clean small kitchens, kitchenettes and tea kitchens

- Specific Outcome 24.1** Prepare for cleaning
- Specific Outcome 24.2** Clean cutlery and crockery
- Specific Outcome 24.3** Clean food preparation equipment (food contact surfaces)
- Specific Outcome 24.4** Clean flat food contact surfaces
- Specific Outcome 24.5** Clean hand contact surfaces
- Specific Outcome 24.6** Clean appliances
- Specific Outcome 24.7** Perform end of task procedure for cleaning kitchens

25. Title: Clean windows, frames and glass panels.

- Specific Outcome 25.1** Prepare for window cleaning
- Specific Outcome 25.2** Clean windows and window frames
- Specific Outcome 25.3** Perform end of task procedures

26. Title: Remove spots from carpets**Specific Outcome 26.1** Prepare for spot and spillage removal**Specific Outcome 26.1** Remove spots and spillages**Specific Outcome 26.3** Identify and report stains**Specific Outcome 26.4** Perform end of task procedures**27. Title: Remove spots from upholstery****Specific Outcome 27.1** Prepare for spots, spillage and odour removal**Specific Outcome 27.2** Remove spots, spillages and odours**Specific Outcome 27.3** Perform end of task procedures for removing spots from upholstery**28. Title: Clean building surrounds****Specific Outcome 28.1** Assess the area, as well as dirt and litter to be removed**Specific Outcome 28.2** Prepare for sweeping**Specific Outcome 28.3** Clean outside surfaces**Specific Outcome 28.4** Perform end of task procedures**29. Title: Buff, burnish and scrub hard and resilient floors****Specific Outcome 29.1** Prepare buffing, burnishing and scrubbing equipment, chemicals and consumables**Specific Outcome 29.2** Prepare the area for buffing, burnishing and scrubbing**Specific Outcome 29.3** Buff hard and resilient floors**Specific Outcome 29.4** Burnish hard and resilient floors**Specific Outcome 29.5** Scrub hard and resilient floors**Specific Outcome 29.6** Perform end of task procedures for buffing, burnishing and scrubbing floors**UNIT STANDARD TITLES AND SPECIFIC OUTCOMES AT NQF LEVEL 2****1. Title: Perform basic calculations****Specific Outcome 1.1** State the objective of the calculation clearly and correctly.**Specific Outcome 1.2** Identify the figures to be calculated from numerical information provided**Specific Outcome 1.3** Perform the calculations using the correct method.

NATIONAL CERTIFICATE IN CONSTRUCTION PLUMBING – NQF 03

Level: 3
Field: Physical Planning and Construction
Sub-field: Building Construction
Credit Totals: 159
Issue date:
Review date:

1. Rationale of the qualification

As a result of past legacies many practitioners within the building construction sector were denied career advancement and possible recognition as qualified tradesmen. This was as a direct result of poor educational opportunities at some schools, leading to a lack of entry to formal training institutions. The introduction of a National Certificate in Construction Plumbing based on unit standards will allow learners to reach their full potential of advancement without formal education becoming an impassable barrier and in addition, allow for the recognition of prior learning.

In terms of existing legislation, designated trades have to become transformed into unit standards-based qualifications. The Sector Skills Plan developed by the CETA showed a definite need for supervisory personnel requiring relevant technical competencies such as those required in construction plumbing.

2. Purpose of the Qualification:

Qualifying learners are able to apply basic health and safety legislation in the form of standards and procedures governing health and safety in the workplace, to render basic first aid, to understand and apply basic plumbing hydraulics, to interpret and apply building drawings, to apply basic pipe design and sizing, to select plumbing system components and materials, to set out their work, to procure the necessary resources, to prepare a work area to do plumbing work, to install and use access equipment, to measure and order materials, and to identify, select and maintain tools and equipment for plumbing, to perform basic building works, including brick masonry, plastering, excavation and backfilling, concrete and benching, to install, maintain, and repair hot and cold water plumbing systems, to install and maintain a below-ground drainage

system, to build drainage system structures, to install on-site sanitation systems, to install and maintain soil, waste water and vent systems, to install and maintain rainwater systems, to fabricate sheet metal components.

A qualified plumber should have : knowledge of different plumbing materials and systems, knowledge of maintenance elements connected with plumbing, knowledge and application of plumbing tools and equipment, knowledge of measurement of quantities and procurement of materials, knowledge of building regulations, water laws and applicable plumbing specifications.

In addition, the qualifying learner will demonstrate competence in two areas of specialisation, elected from :

- apply basic business principles
- maintain and repair plumbing systems including the detection of water leaks, and tracing of hidden pipework
- Install and maintain solar heating systems
- Install and maintain gas piping
- Install and maintain fire protection systems
- Install and maintain Industrial plumbing systems
- Install specialist hospital sanitaryware and gas piping

The qualified learner is also able to competently fulfil plumbing contracts safely and in a professional manner, to ensure that industry standards are maintained.

This qualification has been developed to assist with standardisation across the building industry. This will allow persons to register as a construction Plumber and lay a foundation for future career advancement across similar trades and to supervisory and management qualifications within the sector.

3. Access to the qualification

As this is a unit standard based qualification, any learner who is competent in the unit standards as required by the fundamental, core and elective components stipulated in the qualification, will have free access to this qualification with the provision that he/she meet requirements for the learning assumed to be in place for each unit standard.

4. Unit Standards matrix for construction plumbing :

Unit Standard	ID Number	Composition	Level	Credits
1. Use mathematics to investigate and monitor the financial aspects of personal and business issues	9011	Fundamental	3	5
2. Investigate life and work related problems using data and probabilities	9012	Fundamental	3	5

3. Measure, estimate and calculate physical quantities and explore, describe and explore, describe and represent, interpret and justify geometrical relationships in 2- and 3 – dimensional space relevant to the life or workplace of the community	9013	Fundamental	3	4
4. Work with a wide range of patterns and transformations of functions and solve related problems	3002	Fundamental	3	8
5. Use structured models to describe, represent and analyse shape and motion in 2-and 3- dimensional space	3003	Fundamental	3	4
6. Communications and Language		Fundamentals	3	15
7. Communicate verbally and non-verbally in the workplace	9992	Fundamental	3	8
8. Apply Health and Safety to a Work Area	9995	Core	2	3
9. Render Basic First Aid	9996	Core	2	3
10. Understand and Apply Basic Plumbing Principles		Core	3	8
11. Plan and prepare to perform Plumbing Works		Core	3	8
12. Erect, Use and Dismantle Access Equipment	9967	Core	3	6
13. Procure Materials, Tools and Equipment	9968	Core	3	6
14. Perform basic Building Works		Core	3	8
15. Install and Maintain a Water Supply System		Core	3	12
16. Install and Maintain Drainage Systems		Core	3	12
17. Install and Maintain Soil, Waste water and Vent Systems		Core	3	12
18. Install and maintain Rainwater Systems and fabricate sheetmetal components		Core	3	12
19. Apply Basic Business Concepts	9976	Elective	3	8
20. Maintain and Repair Plumbing Systems		Elective	3	12
21. Install and maintain solar heating systems		Elective	3	12
22. Install and maintain gas piping		Elective	3	12
23. Install and maintain fire protection systems		Elective	3	12
24. Install and maintain Industrial plumbing systems		Elective	3	12
25. Install specialist hospital sanitaryware and gas piping		Elective	3	12
Total credits :			159 (minimum)	

5. Exit level Outcomes

On achieving this qualification a learner will be competent :

- to apply basic health and safety legislation in the form of standards and procedures governing health and safety in the workplace
- to render basic first aid
- to understand and apply basic plumbing hydraulics

that some of the specialist skills connected with gas piping, solar heating and hospital installations were included in core competencies in other SVQ and NVQ's for the international qualifications. The South African stakeholder group decided to include these competencies in electives and to allow a choice of specialisation for the Learner.

9. Articulation Possibilities:

This qualification has been developed for mobility across similar trades within the industry and is intended to allow for further learning towards supervisory and management qualifications within this and other sectors.

This qualification builds on other certificates from a range of sub-sectors and will provide articulation with a range of qualifications in both technical and management areas.

10. Integrated Assessment:

Before qualifying, the learners will be expected to demonstrate competence in a practical situation that integrates the assessment of all specific outcomes, for all unit standards. In addition, during the learning process for each unit standard, learners will be expected to write tests to assess underpinning knowledge, and demonstrate their skills in terms of specific outcomes for the relevant unit standard in assignments and practical exams. Integrated assessment provides learners with an opportunity to display an ability to integrate practical performance, actions, concepts and theory across unit standards to achieve competence in relation to the purpose of this qualification.

11. Criteria for Registration of Assessors:

For an applicant to register as an assessor, the applicant needs:

- A minimum of 2 (two) years' practical, relevant occupational experience
- Detailed documentary proof of educational qualification, practical training undergone, and experience gained by the applicant must be provided (Portfolio of Evidence)
- A recognised assessor qualification

12. Recognition of Prior Learning:

Learners who have met the requirements of any unit standard in this qualification may apply for recognition of prior learning to the Construction Education and Training Authority (CETA), and will be assessed against the assessment criteria and specific outcomes for the relevant unit standard/s. If a candidate is successful in all the unit standards, a whole qualification will be obtained.

13. Moderation:

Assessment of learner achievements takes place at providers accredited by CETA (RSA, 1998b) for the provision of programs that result in the outcomes specified for the National Certificate in Construction Plumbing. CETA is responsible for moderation of learner achievements of learners who meet the requirements of this qualification.

Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.

Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.

Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQAs policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs and in terms of the moderation guideline detailed immediately below.

Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.

Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution which is accredited by the relevant ETQA.

Fundamental Unit Standard Titles Matrix

Unit Standard Title	ID number	NQF level	Number of credits
Numeracy			
Use structured models to describe, represent and analyse shape and motion in 2-and 3-dimensional space	3003	3	4
Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	9011	3	5
Work with a wide range of patterns and basic functions and solve related problems	3002	3	8
Measure, estimate and calculate physical quantities and explore, describe and explore, describe and represent, interpret and justify geometrical relationships in 2- and 3 – dimensional space relevant to the life or workplace of the community	9013	3	4
Investigate life and work related problems using data and probabilities	9012	3	5
Literacy			
Accommodate audience and context needs in oral communication	8415	3	5
Interpret and use information from texts	8969	3	5
Write texts for a range of communicative contexts	8970	3	5
Communicate verbally and non verbally	9993	3	8

Unit Standard Titles

1. Use mathematics to investigate and monitor the financial aspects of personal and business issues (9011)
2. Investigate life and work related problems using data and probabilities (9012)
3. Measure, estimate and calculate physical quantities and explore, describe and explore, describe and represent, interpret and justify geometrical relationships in 2- and 3 – dimensional space relevant to the life or workplace of the community (9013)
4. Work with a wide range of patterns and transformations of functions and solve related problems (3002)
5. Use structured models to describe, represent and analyse shape and motion in 2-and 3- dimensional space (3003)
6. Communications and Language
7. Communicate verbally and non-verbally in the workplace (9992)
8. Apply Health and Safety to a Work Area (9995)
9. Render Basic First Aid (9996)
10. Understand and Apply Basic Plumbing Principles
11. Plan and prepare to perform Plumbing Works
12. Erect, Use and Dismantle Access Equipment (9967)
13. Procure Materials, Tools and Equipment (9968)
14. Perform basic Building Works
15. Install and Maintain a Water Supply System
16. Install and Maintain Drainage Systems
17. Install and Maintain Soil, Waste water and Vent Systems
18. Install and maintain Rainwater Systems and fabricate sheetmetal components
19. Apply Basic Business Concepts (9976)
20. Maintain and Repair Plumbing Systems
21. Install and maintain solar heating systems
22. Install and maintain gas piping
23. Install and maintain fire protection systems
24. Install and maintain Industrial plumbing systems
25. Install specialist hospital sanitaryware and gas piping

UNIT STANDARDS

UNIT STANDARDS TITLES

- Titles 1:** Install and maintain a water supply system
- Titles 2:** Install and maintain drainage systems
- Titles 3:** Install and maintain soil, waste water and vent systems
- Titles 4:** Install and maintain rainwater systems, and fabricate sheet metal components
- Titles 5:** Maintain and repair plumbing systems
- Titles 6:** Plan and prepare to perform plumbing works
- Titles 7:** Perform basic building works
- Titles 8:** Understand and apply basic plumbing principles

UNIT STANDARDS AND SPECIFIC OUTCOMES

TITLE 1: INSTALL AND MAINTAIN A WATER SUPPLY SYSTEM

- Specific Outcome 1: Install and maintain cold water pipes and fittings
- Specific Outcome 2: Install and maintain hot water systems
- Specific Outcome 3: Demonstrate knowledge of fault finding and repair water supply systems

TITLE 2: INSTALL AND MAINTAIN DRAINAGE SYSTEMS

- Specific Outcome 1: Install, inspect and maintain a drainage system
- Specific Outcome 2: Build, inspect and maintain drainage systems structures
- Specific Outcome 3: Install on-site sanitation systems

TITLE 3: INSTALL AND MAINTAIN SOIL, WASTE WATER AND VENT SYSTEMS

- Specific Outcome 1: Install and maintain a one pipe soil pipe system
- Specific Outcome 2: Install and maintain a single stack soil pipe system

Specific Outcome 3: Install soil and waste water fixtures and fittings, and sanitary fittings

TITLE 4: INSTALL AND MAINTAIN RAINWATER SYSTEMS, AND FABRICATE SHEET METAL COMPONENTS

Specific Outcome 1: Mark out, cut and fold sheetmetal

Specific Outcome 2: Make sheetmetal joints

Specific Outcome 3: Fabricate sheetmetal components

Specific Outcome 4: Install and maintain Rainwater systems

TITLE 5: MAINTAIN AND REPAIR PLUMBING SYSTEMS

Specific Outcome 1: Understand and apply diagnostic, correction and upgrading principles

Specific Outcome 2: Inspect, maintain and repair hot and cold water plumbing systems

Specific Outcome 3: Inspect, maintain and repair soil and waste water systems

Specific Outcome 4: Inspect, maintain and repair drainage systems

TITLE 6: PLAN AND PREPARE TO PERFORM PLUMBING WORKS

Specific Outcome 1: Set out work for plumbing

Specific Outcome 2: Procure resources for plumbing

Specific Outcome 3: Prepare work areas for plumbing

TITLE 7: PERFORM BASIC BUILDING WORKS

Specific Outcome 1: Construct brick masonry for manholes and chambers

Specific Outcome 2: Perform in-situ concreting and benching

Specific Outcome 3: Install Precast elements

TITLE 8: UNDERSTAND AND APPLY BASIC PLUMBING PRINCIPLES

Specific Outcome 1: Understand and apply basic plumbing hydraulics

Specific Outcome 2: Interpret and apply building drawings

Specific Outcome 3: Apply basic pipe design and sizing

Specific Outcome 4: Select System components and materials

No. 566

10 May 2002

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Surveying

Registered by NSB 12 Physical Planning and Construction, publishes the following qualifications and unit standard for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the qualification and unit standard upon which qualifications are based. The full qualification and unit standards can be accessed via the SAQA web-site at www.saga.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, 659 Pienaar street, Brooklyn, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 3 June 2002***. All correspondence should be marked **Standards Setting – SGB for Surveying** and addressed to

The Director: Standards Setting and Development
SAQA

Attention: Mr. D Mphuthing
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 482 0907



PP

SAMUEL B.A. ISAACS
EXECUTIVE OFFICER

NATIONAL CERTIFICATE IN GEOMATICS

Field: Physical Planning and Construction - NSB 12

Sub-field: Physical Planning, Design and Management

Level: 4

Credit: 134

Issue date:

Review date:

Purpose:

This qualification has been developed for the Surveying occupational area. It aims, through a planned combination of unit standards, to equip learners with skills and knowledge to undertake Geomatics related tasks and duties in an office or field environment, by collecting spatial data in different forms.

This qualification has been developed to assist with professional advancement across the survey industry. This will allow learners to register as an Assistant Survey Technician and lay a foundation for future career advancement in the survey learning area.

Rationale:

As a result of past legacies many practitioners within the surveying / Geomatics occupational area were denied career advancement and possible registration with the professional survey council. This was as a direct result of poor educational opportunities at some schools, leading to a lack of entry to higher education institutes. The introduction of a National Certificate in Geomatics based on unit standards will allow learners to reach their full potential of advancement without formal education becoming an impassable barrier and in addition, allow for the recognition of prior learning. This qualification will allow for the socio economic empowerment of learners whilst simultaneously improving the skills base of the country and underpin the countries economic development, infrastructure and property.

Access to the qualification:

As this is a unit standard based qualification, any learner who is competent in the unit standards as required by the fundamental, core and elective components stipulated in the qualification, will have free access to this qualification.

Learning assumed to be in place

It is assumed that a learner entering a programme leading to this qualification has achieved a FET Certificate at NQF level 4, and is proficient in Mathematics, Communication and English, or has several years relevant Geomatics/survey experience

Exit Level Outcomes

On achieving this qualification a learner will be able to:

- Undertake work in the field of Geomatics, in any working environment by collecting, presenting and controlling Spatial data in differing forms

- Use a wide variety of advanced instruments, techniques and computer software
- Evaluate raw data and confirm acceptance of Geomatics results
- Perform manual and electronic calculations and produce various Geomatics plans and maps utilising the field data captured
- Display an understanding of the theory in the field of Geomatics, required in support of the practical outcomes
- Safely operate, as an Assistant Geomatics Technician in individual, team or project situations
- Communicate effectively with the world at large
- Develop a set of professional ethics and values regarding the survey discipline
- Undertake supervisory functions while continuously monitoring and adapting own performance

Recognition of prior learning:

Any learner wishing to be assessed may arrange to do so without having to attend further education or training (RPL). The assessor will decide on the most appropriate assessment procedures after discussion with the learner.

Articulation Possibilities:

This qualification has been developed for professional practice across the industry and is intended to provide professional advancement in the industry ensuring the upliftment of the standards in general.

It is applicable to small and large business alike. This qualification builds on other certificates from a range of sub-sectors and will provide articulation with a range of qualifications in both management and service areas of practice.

Criteria for assessment, moderation and provider of learning:

- Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.
- Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.
- Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQAs policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs (including professional bodies); and in terms of the moderation guideline detailed immediately below.
- Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.

Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution which is accredited by the relevant ETQA.

Criteria for Registration of Assessors:

For an applicant to register as an assessor, the applicant needs:

- ♦ A minimum of 2 (two) years' relevant occupational experience at NQF level 6
- ♦ Declared competent in all the outcomes of the National Assessor Unit Standards as stipulated by SAQA
- ♦ Detailed documentary proof of educational qualification, practical training undergone, experience gained by the applicant must be provided (Portfolio of evidence)

Integrated Assessment:

Integrated assessment provides learners with an opportunity to display an ability to integrate practical performance, actions, concepts and theory across unit standards to achieve competence in relation to the purpose of this qualification

Assessment shall:

- Measure the quality of the observed practical performance as well as the theory and underpinning knowledge behind it.
- Use methods that are varied to allow the learner to display thinking and decision making in the demonstration of practical performance.
- Maintain a balance between practical performance and theoretical assessment methods to ensure each is measured in accordance with the level of the qualification
- The relationship between practical and theoretical is not fixed but varies according to the type and level of qualification

International comparability:

Within the surveying field the concept of qualifications based on unit standards is not unique to South Africa. A learner having gained this Qualification will be able to register with the South African Council for Professional and Technical Surveyors and through their reciprocal agreements gain international recognition.

Credit Allocation :

FUNDAMENTAL	CORE	ELECTIVE
51 Credits	63 Credits	20 Credits

FUNDAMENTAL

NQF LEVEL	NLRD Number	UNIT STANDARD TITLE	CREDITS
4	7468	Use mathematics to investigate and monitor the financial aspects of personal, business, and national issues	6
4	9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	6
4	9016	Measure, estimate and calculate physical quantities and explore, critique and prove geometrical relationships in two and three-dimensional space in the life and workplace of the adult with increasing responsibilities	4
4	8974	Engage in sustained oral communication and evaluate spoken text	5
4	8975	Read, analyse and respond to a variety of text	5
4	8976	Write for a wide range of contexts	5
4	8967	Use language and communication in occupational learning programs	5
4		Information Technology in support of the core outcome	15

CORE

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
3	Construct a Cartesian co-ordinate grid and plot points	4
4	Process and verify spirit levelling data in an office environment	2
4	Reduce basic distance measurements (tape or EDM) for use in surveying	2
4	Calculate the provisional position of survey point from polar / traverse observations	3
4	Reduce tacheometric observations and produce a plan	2
4	Calculate provisional coordinates of points using Trilateration and Triangulation	2
4	Reduce Global Navigation Satellite System data to determine the co-ordinates of a survey point	2
4	Perform computer aided survey draughting (CAD)	8
4	Apply map and related spatial information skills for decision making in the workplace	2
4	Obtain information from a plan	4
5	Select a map projection for cartographic design and production	4
5	Perform elementary co-ordinate transformation	4
5	Calculate distance and direction between coordinated survey points	5
5	Determine the final position of a survey point from traverse/polar observations	5
5	Operate a Geographical Information System and components thereof	6
5	Design and produce cartographic products and maps with use of a Geographical Information System	8

ELECTIVE

NQF LEVEL	UNIT STANDRD TITLE	CREDITS
2	Operate a simple stereoscope	3
	AND / OR	
4	Perform Distance measurements using a Tape and Electronic Distance Measurement (EDM)) Equipment	2
4	Determine the elevation of a point by leveling	5
4	Observe the position of a survey point by forward intersection	4
4	Observe the position of a survey point by resection	4
4	Observe spatial position of a survey point by tacheometric methods	4
4	Observe the position of survey point by polar / traversing	4
4	Observe the position of a survey point by trilateration	4
	AND / OR	
4	Interpret photographic detail from aerial photography for annotation purposes	4
4	Read and interpret a flight plan for the identification of area specific aerial photography	2
4	Utilise satellite imagery to identify features and carry out image classification for mapping purposes	2
	AND / OR	
4	Produce reprographic products in a reprographic environment as a part of cartographic production processes	4
	AND / OR	
4	Compute Geodetic information using basic principles and understanding of Geodetic Surveying	2
	AND / OR	
4	Apply an elementary working knowledge of the Land Survey Act No, 8 of 1997 and the Regulations to work carried out within the cadastral environment	5
4	Apply a working knowledge of the Sectional Titles Act No. 95 of 1986 and Regulations to compile Sectional Title documents	6
4	Apply a working knowledge of the Sections of the Deeds Registry Act No 47 of 1937 pertaining to land.	4
4	Compile a diagram and general plan for approval purposes	5
	AND / OR	
5	Determine the final position of a survey point by global positioning systems(GPS)	5
5	Determine the final position of a survey point from resection observations	5
5	Determine the elevation of a survey point by trigonometrical leveling	5
5	Determine the elevation of a point by precise leveling	1
5	Apply basic photogrammetric compilation theory for map production	6
	AND / OR	
5	Design and Produce Cartographic Products using fundamental Cartographic principles.	5
5	Generalize Cartographic Data in the production of Cartographic Products of various themes and scales.	2
	AND / OR	
5	Carry out Surveying on inland waters using Hydrographic principles	5

UNIT STANDARDS IN NATIONAL CERTIFICATE IN GEOMATICS**UNIT STANDARDS ON NQF LEVEL 2**

1. **Title:** Operate a simple stereoscope

UNIT STANDARDS ON NQF LEVEL 3

1. **Title:** Construct a Cartesian co-ordinate grid and plot points

UNIT STANDARDS ON NQF LEVEL 4

1. **Title :** Mathematics in support of the core outcome
2. **Title :** Engage in sustained oral communication and evaluate spoken text
3. **Title :** Read, analyse and respond to a variety of text
4. **Title :** Write for a wide range of contexts
5. **Title :** Use language and communication in occupational learning programs
6. **Title :** Information Technology in support of the core outcome
7. **Title:** Process and verify spirit levelling data in an office environment
8. **Title:** Reduce basic distance measurements (tape or EDM) for use in surveying
9. **Title:** Calculate the provisional position of survey point from polar / traverse observations
10. **Title:** Reduce tacheometric observations and produce a plan
11. **Title:** Calculate provisional coordinates of points using Trilateration and Triangulation
12. **Title:** Reduce Global Navigation Satellite System data to determine the co-ordinates of a survey point
13. **Title:** Perform computer aided survey draughting (cad)
14. **Title:** Apply map and related spatial information skills for decision making in the workplace
15. **Title:** Obtain information from a plan
16. **Title :** Perform Distance measurements using a Tape and Electronic Distance Measurement (EDM) Equipment
17. **Title :** Determine the elevation of a point by leveling
18. **Title :** Observe the position of a survey point by forward intersection
19. **Title :** Observe the position of a survey point by resection
20. **Title :** Observe spatial position of a survey point by tacheometric methods
21. **Title :** Observe the position of survey point by polar / traversing
22. **Title :** Observe the position of a survey point by trilateration
23. **Title :** Interpret photographic detail from aerial photography for annotation purposes
24. **Title :** Read and interpret a flight plan for the identification of area specific aerial photography
25. **Title :** Utilize satellite imagery to identify features and carry out image classification for mapping purposes
26. **Title :** Produce reprographic products in a reprographic environment as a part of cartographic production processes
27. **Title :** Compute Geodetic information using basic principles and understanding of Geodetic Surveying
28. **Title :** Apply an elementary working knowledge of the Land Survey Act No. 8 of 1997 and the Regulations to work carried out within the cadastral environment
29. **Title :** Apply a working knowledge of the Sectional Titles Act No. 95 of 1986 and Regulations to compile Sectional Title documents
30. **Title :** Apply a working knowledge of the Sections of the Deeds Registry Act No 47 of 1937 pertaining to land.
31. **Title :** Compile a diagram and general plan for approval purposes

UNIT STANDARDS ON NQF LEVEL 5

1. **Title:** Select a map projection for cartographic design and production
2. **Title:** Perform elementary co ordinate transformation
3. **Title:** Calculate distance and direction between coordinated survey points
4. **Title:** Determine the final position of a survey point from traverse/polar observations
5. **Title:** Operate a Geographical Information System and components thereof
6. **Title:** Design and produce cartographic products and maps with use of a Geographical Information System
7. **Title :** Determine the final position of a survey point by global positioning systems(GPS)
8. **Title :** Determine the final position of a survey point from resection observations
9. **Title :** Determine the elevation of a survey point by trigonometrical leveling
10. **Title :** Determine the elevation of a point by precise leveling
11. **Title :** Apply basic photogrammetric compilation theory for map production
12. **Title :** Design and Produce Cartographic Products using fundamental Cartographic principles.
13. **Title :** Generalize Cartographic Data in the production of Cartographic Products of various themes and scales.
14. **Title :** Carry out Surveying on inland waters using Hydrographic principles

UNIT STANDARDS AND OUTCOMES IN NATIONAL CERTIFICATE IN GEOMATICS**UNIT STANDARDS ON NQF LEVEL 2****1. Title: Operate a simple stereoscope****Specific Outcome 1.1:** Operate a simple stereoscope**Specific Outcome 1.2:** Baseline two adjoining photographs and eliminate Y parallax**Specific Outcome 1.3:** Perform stereoscopic photo-interpretation**UNIT STANDARDS ON NQF LEVEL 3****1. Title: Construct a Cartesian co-ordinate grid and plot points****Specific Outcome 1.1:** Demonstrate an understanding of co-ordinate surveying**Specific Outcome 1.2:** Construct a Cartesian co-ordinate grid**Specific Outcome 1.3:** Plot the position of points on a grid**Specific Outcome 1.4:** Complete the plotting process in accordance with survey standards**UNIT STANDARDS ON NQF LEVEL 4****1. Title: Mathematics in support of the core outcome****2. Title: Engage in sustained oral communication and evaluate spoken text****Specific Outcome 2.1:** Respond critically yet sensitively as a learner**Specific Outcome 2.2:** Analyse own responses to spoken texts and adjust as required.**Specific Outcome 2.3:** Use strategies to be an effective speaker in sustained oral interactions**Specific Outcome 2.4:** Evaluate spoken discourse.**3. Title: Read, analyse and respond to a variety of text****Specific Outcome 3.1:** Analyse and criticise texts produced for a range of purposes, audiences and contexts**Specific Outcome 3.2:** Identify and explain the values, attitudes and assumptions in texts.**Specific Outcome 3.3:** Evaluate the effects of content, language and style on readers' responses in specific texts**4. Title: Write for a wide range of contexts****Specific Outcome 4.1:** Write effectively on topics**Specific Outcome 4.2:** Choose language structures and features to suit communicative purpose/s**Specific Outcome 4.3:** Edit writing for fluency and unity**5. Title: Use language and communication in occupational learning programs****Specific Outcome 5.1:** Access, use and manage suitable learning resources**Specific Outcome 5.2:** Formulate and use learning strategies**Specific Outcome 5.3:** Manage occupational learning materials**Specific Outcome 5.4:** Conduct basic research and analyse and present findings**Specific Outcome 5.5:** Lead and function in a team**Specific Outcome 5.6:** Reflect on how characteristics of the workplace and occupational context affect learning**6. Title: Information Technology in support of the core outcome**

- 7. Title: Process and verify spirit levelling data in an office environment.**
Specific Outcome 7.1: Demonstrate a basic understanding of levelling
Specific Outcome 7.2: Demonstrate a basic understanding of different levelling types
Specific Outcome 7.3: Process the elevation of a point from levelling data
Specific Outcome 7.4: Complete the work sequence in accordance with survey standards

- 8. Title: Reduce basic distance measurements (tape or EDM) for use in surveying**
Specific Outcome 8.1: Demonstrate basic knowledge related to instruments used for distance measurement in surveying
Specific Outcome 8.2: Demonstrate a basic understanding of the theory and principles associated with distance measurement for the use in surveying
Specific Outcome 8.3: Demonstrate a basic understanding of the principles associated with distance reduction to survey datum
Specific Outcome 8.4: Reduce basic distance measurements in accordance with survey standards

- 9. Title: Calculate the provisional position of survey point from polar / traverse observations**
Specific Outcome 9.1: Demonstrate understanding related to polar/Traverse calculations
Specific Outcome 9.2: Calculate the provisional position of a survey point
Specific Outcome 9.3: Complete the calculation process in accordance with Survey Standards

- 10. Title: Reduce tacheometric observations and produce a plan**
Specific Outcome 10.1: Demonstrate understanding related to plans and tacheometric calculations
Specific Outcome 10.2: Plot tacheometric data on a plan
Specific Outcome 10.3: Complete the plotting process in accordance with Survey standards

- 11. Title: Calculate provisional coordinates of points using Trilateration and Triangulation**
Specific Outcome 11.1: Demonstrate basic knowledge related to Intersection, Resection and Trilateration
Specific Outcome 11.2: Calculate the provisional position of points fixed by Intersection, Resection and Trilateration
Specific Outcome 11.3: Demonstrate basic knowledge of supplementary procedures associated with Intersection, Resection and Trilateration

- 12. Title: Reduce Global navigation satellite System data to determine the co-ordinates of a survey point**
Specific Outcome 12.1: Demonstrate a basic understanding of the theory and principles of Global Positioning Systems (GPS)
Specific Outcome 12.2: Demonstrate a basic understanding of the theoretical concepts of GPS error sources
Specific Outcome 12.3: Demonstrate knowledge related to GPS Survey Techniques
Specific Outcome 12.4: Calculate the position of a point from GPS data

- 13. Title: Perform computer aided survey draughting (CAD)**
Specific Outcome 13.1: Demonstrate understanding related to computer aided draughting (CAD).
Specific Outcome 13.2: Perform computer aided draughting.
Specific Outcome 13.3: Complete the draughting process.

14. Title: Apply map and related spatial information skills for decision making in the workplace

- Specific Outcome 14.1:** Demonstrate the ability to use aerial photographs and maps for orientation
- Specific Outcome 14.2:** Develop the ability to apply map scales
- Specific Outcome 14.3:** Demonstrate the skills to read orthophoto maps, the South African topographic map series and the South African topo-cadastral map series
- Specific Outcome 14.4:** Demonstrate the knowledge and skills to apply the geographical co-ordinate system
- Specific Outcome 14.5:** Demonstrate ability to apply spatial information to effective decision-making in matters related to land, sustainable development and the use of natural resources

15. Title: Obtain information from a plan

- Specific Outcome 15.1:** Demonstrate understanding related to obtaining information from a plan.
- Specific Outcome 15.2:** Obtain information from a plan.
- Specific Outcome 15.3:** Complete the work sequence in accordance with the Surveying standards

16. Title : Perform distance measurements using a Tape and Electronic Distance Measurement (EDM) Equipment

- Specific Outcome 16.1:** Demonstrate basic knowledge related to Tape and EDM instruments and planning required for distance measurement
- Specific Outcome 16.2:** Prepare to perform Tape and EDM distance measurement in accordance with task specific requirements.
- Specific Outcome 16.3:** Perform Tape and EDM distance measurement in accordance with task specific standards
- Specific Outcome 16.4:** Complete the work sequence for distance measurement

17. Title : Determine the elevation of a point by leveling

- Specific Outcome 17.1:** Demonstrate understanding of leveling
- Specific Outcome 17.2:** Prepare for leveling
- Specific Outcome 17.3:** Perform leveling observations
- Specific Outcome 17.4:** Calculate the elevation of a point
- Specific Outcome 17.5:** Complete the work sequence in accordance with Survey standards

18. Title : Observe the position of a survey point by forward intersection

- Specific Outcome 18.1:** Demonstrate understanding related to forward intersection
- Specific Outcome 18.2:** Plan and prepare to observe a survey point by forward intersection
- Specific Outcome 18.3:** Observe a survey point by forward intersection and verify the field observations
- Specific Outcome 18.4:** Complete the work sequence in accordance with Survey standards

19. Title: Observe the position of a survey point by resection

- Specific Outcome 19.1:** Demonstrate understanding related to resection
- Specific Outcome 19.2:** Plan and prepare to observe a survey point by resection
- Specific Outcome 19.3:** Observe a survey point by resection and verify the field observations
- Specific Outcome 19.4:** Complete the work sequence in accordance with Survey Standards

20. Title: Observe spatial position of a survey point by tacheometric methods**Specific Outcome 20.1:** Demonstrate understanding related to tachometry**Specific Outcome 20.2:** Plan and prepare to observe a survey points using tachometric methods**Specific Outcome 20.3:** Observe survey points using tachometric methods and verify the field observations**Specific Outcome 20.4:** Complete the work sequence in accordance with Survey standards**21. Title: Observe the position of survey point by polar / traversing****Specific Outcome 21.1:** Demonstrate understanding related to polar/traversing**Specific Outcome 21.2:** Plan and prepare to observe a survey point by polar/traversing**Specific Outcome 21.3:** Observe a survey point by polar/traversing and verify the field observations**Specific Outcome 21.4:** Complete the work sequence in accordance with Survey standards**22. Title: Observe the position of a survey point by trilateration****Specific Outcome 22.1:** Demonstrate understanding related to Trilateration**Specific Outcome 22.2:** Plan and prepare to observe a survey point by Trilateration**Specific Outcome 22.3:** Observe a survey point by Trilateration**Specific Outcome 22.4:** Complete the work sequence in accordance with Survey standards**23. Title: Interpret photographic detail from aerial photography for annotation purposes****Specific Outcome 23.1:** Describe the theory and principles associated with aerial photography**Specific Outcome 23.2:** Plan and prepare for annotation in the field**Specific Outcome 23.3:** Understand the legal, ethical and hazardous working environment of annotating photographs in the field**Specific Outcome 23.4:** Add place names and other important annotated detail as required on aerial photography for mapping purposes**Specific Outcome 23.5:** Interpret and annotate aerial photographic images for mapping purposes**24. Title: Read and interpret a flight plan for the identification of area specific aerial Photography****Specific Outcome 24.1:** Demonstrate an understanding of flight plans**Specific Outcome 24.2:** Read and Interpret a flight plan**Specific Outcome 24.3:** Plot the positions of aerial photographs on a flight plan**25. Title: Utilise satellite imagery to identify features and carry out image classification for mapping purposes****Specific Outcome 25.1:** Demonstrate basic principles of remote sensing satellites**Specific Outcome 25.2:** Demonstrate basic principles of satellite imagery**Specific Outcome 25.3:** Demonstrate a basic knowledge of different types of satellite imagery and their usages**Specific Outcome 25.4:** Identify features and classify areas using satellite imagery for mapping purposes**26. Title: Produce reprographic products in a reprographic environment as a part of cartographic production processes****Specific Outcome 26.1:** Demonstrate a basic understanding of reprographic processes**Specific Outcome 26.2:** Demonstrate a basic understanding of different machinery used in reprographic processes**Specific Outcome 26.3:** Produce reprographic products for Cartographic production processes

Specific Outcome 26.4: Complete the work sequence in the Reprographic and Cartographic environment

27. Title: Compute Geodetic information using basic principles and Geodetic Surveying

Specific Outcome 27.1: Demonstrate knowledge on the basic concepts of Geodetic Surveying

Specific Outcome 27.2: Demonstrate knowledge on the basic concepts of Astronomical Observations

Specific Outcome 27.3: Demonstrate knowledge of basic Triangulation Networks

Specific Outcome 27.4: Demonstrate knowledge of the basic concepts of Leveling Networks

Specific Outcome 27.5: Calculate basic geodetic quantities from triangulation and leveling observations

28. Title: Apply an elementary working knowledge of the Land Survey Act, No. 8 of 1997 and the Regulations to work carried out within the cadastral environment

Specific Outcome 28.1: Explain the purpose of the Land Survey Act, No. 8 of 1997.

Specific Outcome 28.2: Explain the purpose of the Regulations framed under the Land Survey Act, No. 8 of 1997.

Specific Outcome 28.3: Demonstrate a working knowledge of the Land Survey Act, No. 8 of 1997.

Specific Outcome 28.4: Demonstrate a working knowledge of the Regulations framed under the Land Survey Act, No. 8 of 1997

Specific Outcome 28.5: Apply the knowledge of the Land Survey Act, No. 8 of 1997, and the Regulations framed thereunder, to work carried out within the cadastral environment

29. Title: Apply a working knowledge of the Sectional Titles Act No. 95 of 1986 and Regulations to compile Sectional Title documents

Specific Outcome 29.1: Explain the purpose of the Sectional Titles Act, No. 95 of 1986.

Specific Outcome 29.2: Explain the purpose of Sectional Titles Regulations.

Specific Outcome 29.3: Demonstrate a knowledge of the Sectional Titles Act No. 95 of 1986, and the regulations framed thereunder.

Specific Outcome 29.4: Apply the knowledge of the Sectional Titles Act No. 95 of 1986, and the Regulations, to Sectional Title work as pertaining to Surveying

30. Title: Apply a working knowledge of the Sections of the Deeds Registry Act No 47 of 1937 pertaining to land.

Specific Outcome 30.1: Explain the purpose of land related Sections of Deeds Registry Act

Specific Outcome 30.2: Demonstrate a knowledge of land related Sections of Deeds Registries Act, No. 47 of 1937 and regulations thereof

Specific Outcome 30.3: Identify and explain the role of land related Sections of Deeds Registry Act

Specific Outcome 30.4: Apply a working knowledge of the land related Sections of Deeds Registry Acts pertaining to land

31. Title: Compile a diagram and general plan for approval purposes

Specific Outcome 31.1: Demonstrate a knowledge of the workings of the office of the Surveyor-General.

Specific Outcome 31.2: Identify the statutory consents required for approval and registration purposes.

- Specific Outcome 31.3:** Demonstrate a knowledge of the necessary submissions in support of the cadastral documents as required by the office of the Surveyor-General.
- Specific Outcome 31.4:** Demonstrate a knowledge of post-approval processes prior to registration
- Specific Outcome 31.5:** Compile Cadastral documents prior to approval

UNIT STANDARDS ON NQF LEVEL 5

1. Title: Select a map projection for cartographic design and production

- Specific Outcome 1.1:** Demonstrate a basic understanding of concepts associated with Map Projections
- Specific Outcome 1.2:** Demonstrate a basic understanding of Geodetic concepts associated with Map Projections.
- Specific Outcome 1.3:** Select a Map Projection for Cartographic Design and Projection

2. Title: Perform elementary co ordinate transformation

- Specific Outcome 2.1:** Demonstrate understanding related to co-ordinate transformations
- Specific Outcome 2.2:** Transform co-ordinates
- Specific Outcome 2.3:** Complete the work sequence in accordance with the Surveying standards

3. Title: Calculate distance and direction between coordinated survey points

- Specific Outcome 3.1:** Demonstrate understanding related to distance and direction calculations between two survey points
- Specific Outcome 3.2:** Calculate the distance and direction between two survey points
- Specific Outcome 3.3:** Complete the calculation process in accordance with the Surveying standards

4. Title: Determine the final position of a survey point from traverse/polar observations

- Specific Outcome 4.1:** Demonstrate understanding of precise leveling
- Specific Outcome 4.2:** Prepare for precise leveling
- Specific Outcome 4.3:** Perform precise leveling observations
- Specific Outcome 4.4:** Calculate the elevation of a point
- Specific Outcome 4.5:** Complete the work sequence in accordance with Survey standards

5. Title: Operate a Geographical Information System and components thereof

- Specific Outcome 5.1:** Demonstrate knowledge of the History and Development of Geographical Information Systems
- Specific Outcome 5.2:** Demonstrate a basic understanding of the theoretical concepts of Geographical Information Systems Functionality.
- Specific Outcome 5.3:** Demonstrate a basic understanding of the theoretical concepts associated with Data Management of Geographical Information Systems
- Specific Outcome 5.4:** Operate a Geographical Information System in a Geomatics environment

6. Title: Design and produce Cartographic products and maps with use of a Geographical Information System

- Specific Outcome 6.1:** Undertake planning associated with the design and production of a Cartographic product using Geographical Information Systems

- Specific Outcome 6.2:** Manage the process of designing and producing a Cartographic product using Geographical Information Systems
- Specific Outcome 6.3:** Design and produce a Cartographic product with the use of Geographical Information Systems
- Specific Outcome 6.4:** Complete the work sequence in accordance with Geographical Information Systems requirements

7. Title : Determine the final position of a survey point by global positioning systems(GPS)

- Specific Outcome 7.1:** Demonstrate understanding of GPS operating procedures and principles
- Specific Outcome 7.2:** Prepare for GPS observations
- Specific Outcome 7.3:** Record the position of a survey point
- Specific Outcome 7.4:** Complete the work sequence in accordance with Survey standards

8. Title : Determine the final position of a survey point from resection observations

- Specific Outcome 8.1:** Demonstrate understanding of fixing the final position of a survey point by resection
- Specific Outcome 8.2:** Determine the final position of the survey point
- Specific Outcome 8.3:** Complete the work sequence in accordance with Survey standards

9. Title: Determine the elevation of a survey point by trigonometrical leveling

- Specific Outcome 9.1:** Demonstrate understanding associated with trigonometrical leveling
- Specific Outcome 9.2:** Prepare to observe a survey point by trigonometrical leveling
- Specific Outcome 9.3:** Observe a survey point by trigonometrical leveling
- Specific Outcome 9.4:** Calculate the elevation of a survey point
- Specific Outcome 9.5:** Complete the work sequence in accordance with Survey Standards

10. Title : Determine the elevation of a point by precise leveling

- Specific Outcome 10.1:** Demonstrate understanding of precise leveling
- Specific Outcome 10.2:** Prepare for precise leveling
- Specific Outcome 10.3:** Perform precise leveling observations
- Specific Outcome 10.4:** Calculate the elevation of a point
- Specific Outcome 10.5:** Complete the work sequence in accordance with Survey standards

11. Title : Apply basic photogrammetric compilation theory for map production

- Specific Outcome 11.1:** Demonstrate knowledge related to the preparatory tasks for photogrammetric compilation
- Specific Outcome 11.2:** Demonstrate knowledge related to the compilation of spot heights and contours
- Specific Outcome 11.3:** Demonstrate knowledge associated with the compilation of detail
- Specific Outcome 11.4:** Demonstrate knowledge related to edge matching when compiling a map or model
- Specific Outcome 11.5:** Compile a thematic plan or map using manual or digital processes.

12. Title: Design and Produce Cartographic Products using fundamental Cartographic principles

- Specific Outcome 12.1:** Demonstrate a basic understanding of the theoretical concepts of Cartographic Design

- Specific Outcome 12.2:** Demonstrate a basic understanding of the theoretical concepts of Cartography
- Specific Outcome 12.3:** Demonstrate a basic understanding of the theoretical concepts associated with Cartographic Production
- Specific Outcome 12.4:** Design and produce cartographic products using fundamental cartographic principles

13. Title : Generalize Cartographic Data in the production of Cartographic Products of various themes and scales

- Specific Outcome 13.1:** Demonstrate a basic understanding of Cartographic Generalisation techniques
- Specific Outcome 13.2:** Demonstrate a basic understanding of the Control Measures of Cartographic Generalisation
- Specific Outcome 13.3:** Compile a Map or Map related product using Cartographic Generalisation Techniques

14. Title: Carry out Surveying on inland waters using Hydrographic principles

- Specific Outcome 14.1:** Demonstrate knowledge related to Hydrographic Surveying
- Specific Outcome 14.2:** Prepare to carry out a Hydrographic Survey on inland waters
- Specific Outcome 14.3:** Carry out a Hydrographic Survey on inland water
- Specific Outcome 14.4:** Complete the work sequence in accordance with Hydrographic survey standards
- Specific Outcome 14.5:** Reduction of field Hydrographic data for inland waters

Notes:

The Qualification – National Certificate in Geomatics at level 4 is made up of a number of learning areas. A minimum of 20 credits is required from the elective. The learning areas are:

Fundamental:		Credits
Mathematics		20
Communication		16
Information Technology		15
Core:		
GIS	Includes levels 3, 4 & 5	26
Survey Theory	Includes levels 4 & 5	23
Maps and Map projections	Includes levels 4 & 5	14
Elective:		
Photogrammetry	Includes levels 2, 4 & 5	17
Survey Practical	Includes levels 4 & 5	43
Cartography	Includes levels 4 & 5	11
Geodesy	Level 4	2
Cadastral	Level 4	20
Hydrographic Surveying	Level 4	5

All unit standards within the Fundamental and Core have to be completed for the qualification.

To be proficient in any one learning area under the Elective of the Qualification, it is recommended that all unit standards within that learning area be completed. A minimum of 20 credits from the Elective must be completed for the qualification.

No. 567

10 May 2002

NATIONAL FIRST DEGREE IN GEOMATICS

Field: Physical Planning and Construction - NSB 12
Sub-field: Physical Planning, Design and Management
Level: 6
Credit: 394

Issue date:**Review date:****Purpose:**

This qualification has been developed for the surveying occupational area. It aims, through a planned combination of unit standards, to allow a person to manage survey /geomatic operations in any standard working environment, by collecting, presenting and controlling spatial data in differing formats. This qualification has been developed to assist with professional advancement across the survey industry. This will allow persons to register as survey technologist and lay a foundation for future career advancement in surveying/geomatics.

Rationale:

As a result of past legacies many practitioners within the surveying occupational area were denied career advancement and possible registration with the professional survey council. This was as a direct result of poor educational opportunities at some schools, leading to a lack of entry to higher education institutes. The introduction of a National First Degree in geomatics based on unit standards will allow learners to reach their full potential of advancement without formal education becoming an impassable barrier and in addition, allow for the recognition of prior learning. This qualification will allow for the socio economic empowerment of learners whilst simultaneously improving the skills base of the country and underpin the country's economic development, infrastructure, property, marine environment and mining.

Access to the qualification:

As this is a unit standard based qualification, any learner who is competent in the unit standards as required by the fundamental, core and elective components stipulated in the qualification, will have free access to this qualification.

Learning assumed to be in place:

It is assumed that a learner entering a programme leading to this qualification has achieved a FET Certificate at NQF level 5 or equivalent and is proficient in mathematics, communication and English. 240 credits obtained in one of the following:-
National Diploma in Surveying or Photogrammetry or Hydrographic Surveying, or has several years' relevant survey experience in the appropriate field assessed and accredited to be the equivalent of one of the above Diploma's.

Exit level Outcomes:

On achieving this qualification a learner will be able to:

- Manage field surveys in any working environment by collecting, presenting and controlling spatial data in differing forms
- Use a wide variety of advanced survey instruments, survey techniques and computer software in the design of survey networks
- Evaluate raw data and confirm acceptance of survey results
- Perform manual and electronic calculations and produce advanced complex survey plans utilising the field data captured
- Display an understanding of survey theory required in support of the survey outcomes
- Manage survey operations in individual, team or project situations within accepted safety legislation, norms and procedures
- Communicate effectively with the world at large
- Apply a set of professional ethics and values regarding the survey discipline
- Undertake senior managerial functions while continuously monitoring and adapting own performance

Recognition of prior learning:

Any learner wishing to be assessed may arrange to do so without having to attend further education or training (RPL). The assessor will decide on the most appropriate assessment procedures after discussion with the learner.

Articulation Possibilities:

This qualification will allow learners access to a NQF level 7 qualification based on unit standards in the survey/ geomatics learning area.

With this qualification the possibility exists of being admitted to a NQF level 7 qualification offered in a higher educational institution.

This qualification has been developed for professional practice across the industry and is intended to provide professional advancement to senior management in the industry ensuring the upliftment of the standards in general.

It is applicable to small and large business alike. This qualification builds on other certificates from a range of sub-sectors and will provide articulation with a range of qualifications in both management and service areas of practice and provide access to NQF Level 7 professional qualifications.

Criteria for assessment, moderation and provider of learning:

- Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.
- Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.
- Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQAs policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs (including professional bodies); and in terms of the moderation guideline detailed immediately below.
- Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.

Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution which is accredited by the relevant ETQA.

Criteria for Registration of Assessors:

For an applicant to register as an assessor, the applicant needs:

A minimum of 3 (three) years' practical, relevant occupational experience at NQF level 6 or a relevant qualification at NQF 7 or higher and a minimum of 2 (two) years relevant occupational experience.

To be declared competent in all the outcomes of the National Assessor Unit Standards as stipulated by SAQA.

To provide detailed documentary proof of educational qualification, practical training undergone, and experience gained by the applicant (Portfolio of evidence)

Integrated Assessment:

Integrated assessment provides learners with an opportunity to display an ability to integrate practical performance, actions, concepts and theory across unit standards to achieve competence in relation to the purpose of this qualification

Assessment shall:

- Measure the quality of the observed practical performance as well as the theory and underpinning knowledge behind it.
- Use methods that are varied to allow the learner to display thinking and decision making in the demonstration of practical performance.
- Maintain a balance between practical performance and theoretical assessment methods to ensure each is measured in accordance with the level of the qualification
- The relationship between practical and theoretical knowledge is not fixed but varies according to the type and level of qualification

International comparability:

Within the surveying/geomatics field the concept of qualifications based on unit standards is not unique to South Africa. There may be similar qualifications in other countries. A learner having gained this Qualification will be able to register with the South African Council for Professional and Technical Surveyors and, through their reciprocal agreements, may gain international recognition.

Credit Allocation :

FUNDAMENTAL	CORE	ELECTIVE
30 Credits	95 Credits	30 Credits

FUNDAMENTAL

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
6	Maths, Physics and Statistics in support of the core outcome	30

CORE

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
5	Plan and execute a survey using GNSS / GPS	8
6	Plan, execute and analyse the survey of points using GNSS/GPS	10
6	Perform advanced co-ordinate conversion	5
6	Adjust and evaluate a control survey network	5
6	Customise a generic GIS to an individual specification	10
6	Select a data structure for Geographic Information Systems	8
6	Select a map projection and transform data between projections or ellipsoids	3
6	Design a cartographic product according to cartographical	8

	specifications and design standards	
6	Perform computations of distances and directions on the spheroid and reductions to the projection plane	3
6	Interpret the professional and technical surveyors Act 40 of 1984 and the rules framed thereunder	3
6	Determine the final position of a survey point by least square adjustment	12
6	Develop a local geometric geoid from GPS / GNSS	3
6	Compile a survey record and accompanying documentation for submission to the survey general	5
6	Investigate and interpret theory relating to remote sensing including aerial cameras	7
7	Design a control survey network	5

ELECTIVE

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
6	Plan offshore electronic positioning for hydrographic purposes	7
6	Control offshore electronic positioning for hydrographic purposes	7
6	Plan acoustic positioning for hydrographic purposes	7
6	Control acoustic positioning for hydrographic purposes	7
6	Plan a geotechnical survey for hydrographic purposes	7
6	Control a geotechnical survey for hydrographic purposes	7
	AND / OR	
6	Collect metadata as a means to document data sets	8
6	Capture spatial data for Geographical information systems using single phase GPS / GNSS	6
	AND / OR	
6	Compare the South African cadastre to other cadastres	5
	AND / OR	
5	Produce a cartographical product using reprographic techniques	6
6	Produce cartographical products according to cartographical specifications and design standards	6
	AND / OR	
6	Photogrammetry	30
	AND / OR	
6	Management principles and practice and / or undertake financial management and / or display an ability to manage projects	42
	AND / OR	
6	Minerals surveying	42

UNIT STANDARDS IN NATIONAL FIRST DEGREE IN GEOMATICS**UNIT STANDARDS ON NQF LEVEL 5**

1. Title Plan and execute a survey using GNSS / GPS
2. Title Produce a cartographical product using reprographic techniques

UNIT STANDARDS ON NQF LEVEL 6

1. Title **Fundamental:-** Maths, Physics and Statistics in support of the core outcome
2. Title Plan execute and analyse the survey of points using GNSS / GPS
3. Title Perform advanced survey co-ordinate conversion
4. Title Adjust and evaluate a control survey network
5. Title Customise a generic GIS to an individual specification
6. Title Select a data structure for Geographic information systems
7. Title Select a map projection and transform data between projections and ellipsoids
8. Title Design a cartographical product according to cartographical specifications and design standards.
9. Title Perform computations of distances and directions on the spheroid and reductions on the projection plane
10. Title Interpret the professional and technical Surveyors Act 40 of 1984 and rules framed thereunder
11. Title Determine the final position of a survey point by least square adjustment
12. Title Develop a local geometric geoid from GPS / GNSS
13. Title Compile a survey record and accompanying documentation for submission to the Survey General
14. Title Investigate and interpret the theory relating to remote sensors including aerial cameras
15. Title Plan offshore electronic positioning for hydrographic purposes
16. Title Control offshore electronic positioning for hydrographic purposes
17. Title Plan acoustic positioning for hydrographic purposes
18. Title Control acoustic positioning for hydrographic purposes
19. Title Plan a geotechnical survey for hydrographic purposes
20. Title Control a geotechnical survey for hydrographic purposes
21. Title Collect metadata as a means to document data sets
22. Title Capture spatial data for GIS using single phase GPS/ GNSS
23. Title Compare the South African Cadastral system to other cadastres
24. Title Produce a cartographical product according to cartographical design standards
25. Title **Elective:-** Display competence in Photogrammetry and / or Minerals Surveying and/or Management Principles and Practice and/or undertake Financial Management and/or Display an ability to manage project

UNIT STANDARDS ON NQF LEVEL 7

1. Title: Design and control networks

UNIT STANDARDS AND OUTCOMES**UNIT STANDARDS ON NQF LEVEL 5****1. Title: Plan and execute a survey using GNSS / GPS**

- Specific Outcome 1.1:** Demonstrate a knowledge of GPS positioning principles and procedures
- Specific Outcome 1.2:** Prepare for position of survey points by GPS
- Specific Outcome 1.3:** Determine the preliminary position of survey points
- Specific Outcome 1.4:** Complete the work sequence in accordance with survey standards

2. Title: Produce a Cartographical product using reprographic techniques

- Specific Outcome 2.1:** Identify and evaluate preprinting printing process
- Specific Outcome 2.2:** Identify and evaluate printing process both digital and conventional
- Specific Outcome 2.3:** Demonstrate a knowledge and understanding of the elements involved in producing cartographical images and the equipment to achieve these results
- Specific Outcome 2.4:** Demonstrate a knowledge and understanding of image setting, phototypesetting, electronic page makeup and scanning techniques
- Specific Outcome 2.5:** Identify and evaluate products used to achieve the final printed result in cartography
- Specific Outcome 2.6:** Produce a cartographical product using reprographic techniques

UNIT STANDARDS ON NQF LEVEL 6**1. Title: Fundamental in support of Core competency**

- Specific Outcome 1.1:** Maths
- Specific Outcome 1.2:** Physics
- Specific Outcome 1.3:** Statistics

2. Title: Plan, execute and analyse the survey of points using GNSS / GPS

- Specific Outcome 2.1:** Display knowledge of global navigation satellite systems (GNSS) and global positioning systems (GPS), theory, principles and processing techniques in particular
- Specific Outcome 2.2:** Plan, prepare execute and process GPS surveys
- Specific Outcome 2.3:** Evaluate and relate derived survey to national control survey network
- Specific Outcome 2.4:** Complete the work sequence in accordance with Survey standards

3. Title: Perform advanced co ordinate conversion

- Specific Outcome 3.1:** Demonstrate understanding and knowledge of advanced co ordinate conversions
- Specific Outcome 3.2:** Convert co ordinates
- Specific Outcome 3.3:** Complete the work sequence in accordance with Survey standards

4. Title: Adjust and evaluate a control survey network

- Specific Outcome 4.1:** Demonstrate knowledge relating to the adjustment and evaluation of control survey networks

- Specific Outcome 4.2:** Plan and prepare to adjust and evaluate a control survey network
- Specific Outcome 4.3:** Calculate and evaluate the adjusted co ordinates and display the survey plan

5. Title: Customise a generic GIS to an individual specifications

- Specific Outcome 5.1:** Demonstrate knowledge related to the process of customising a desk top GIS to an individual specification
- Specific Outcome 5.2:** Demonstrate knowledge of the tools and techniques available for desk top GIS customisation.
- Specific Outcome 5.3:** Demonstrate knowledge of project planning and of software development life cycles
- Specific Outcome 5.5:** Customise a generic desktop GIS
- Specific Outcome 5.4:** Complete the work sequence in accordance with the requirements and standards for the task

6. Title: Select a data structure for Geographic information systems

- Specific Outcome 6.1:** Display knowledge related to data based structures
- Specific Outcome 6.2:** Display knowledge of Raster data structures
- Specific Outcome 6.3:** Display knowledge of Vector data structures
- Specific Outcome 6.4:** Select a data structure for GIS

7. Title: Select a map projection and transform data between projections or ellipsoids

- Specific Outcome 7.1:** Display a knowledge and understanding of ellipsoidal representation of the earth
- Specific Outcome 7.2:** Transform data between ellipsoids
- Specific Outcome 7.3:** Display a knowledge and understanding of map projections
- Specific Outcome 7.4:** Select a map projection to meet specifications
- Specific Outcome 7.5:** Transform data between map projections and ellipsoids

8. Title: Design a cartographic product according to cartographical specifications and design standards.

- Specific Outcome 8.1:** Display a knowledge and understanding of different cartographical products and design criteria
- Specific Outcome 8.2:** Design a map .
- Specific Outcome 8.3:** Evaluate the map

9. Title: Perform computations of distance and directions on the spheroid and reductions to the projection plane

- Specific Outcome 9.1:** Demonstrate knowledge of spherical trigonometry
- Specific Outcome 9.2:** Calculate spherical azimuths and distances from rules of spherical trigonometry
- Specific Outcome 9.3:** Perform reductions of ellipsoidal distances and direction to transverse mercator projection

10. Title: Interpret the professional and technical surveyors Act 40 of 1984 and rules framed thereunder

- Specific Outcome 10.1:** Interpret the purpose of the professional and technical surveyors Act 40 of 1984
- Specific Outcome 10.2:** Examine the purpose of the rules of the South African Council for Professional and Technical surveyors
- Specific Outcome 10.3:** Interpret the professional and technical surveyors act and rules
- Specific Outcome 10.4:** Examine the structure of the South African Survey profession

Specific Outcome 10.5: Describe and explain ethical conduct as expected from registered persons

11. Title: Determine the final position of a survey point by least square adjustment

Specific Outcome 11.1: Demonstrate knowledge of least square adjustment

Specific Outcome 11.2: Determine the final position of the survey point

Specific Outcome 11.3: Complete the work sequence in accordance with survey standards

12. Title: Develop a local geometric geoid from GPS / GNSS

Specific Outcome 12.1: Display an understanding of the concepts and effect of geoid, mean sea level, and spheroid as a reference surfaces for heighting

Specific Outcome 12.2: Develop a local geometric geoid given GPS / GNSS derived and known orthometric heights

Specific Outcome 12.3: Apply generated geometric geoid heights to derive orthometric heights from addition GPS / GNSS derived heights

- 13. Title: Compile a survey record and accompanying documentation for submission to the Survey General**
- Specific outcome 13.1:** Demonstrate a knowledge and understanding of the Land Survey Act No8 of 1997 and regulations
- Specific Outcome 13.2:** Demonstrate a knowledge and understanding of the Sectional Titles Act 95 of 1986 and regulations
- Specific Outcome 13.3:** Demonstrate a knowledge and understanding of the legislation applicable to cadastral surveys
- Specific Outcome 13.4:** Demonstrate a knowledge and understanding of registration matters
- Specific Outcome 13.5:** Demonstrate a knowledge and understanding of the requirements for approval of a diagram / plan for registration purposes
- Specific Outcome 13.6:** Compile a survey record and accompanying documentation for submission to the Survey general
- 14. Title: Investigate and interpret theory relating to remote sensing including aerial cameras**
- Specific Outcome 14.1:** Display knowledge and understanding of design of a passive remote sensor
- Specific Outcome 14.2:** Display knowledge and understanding of aerial camera and scanning systems
- Specific Outcome 14.3:** Display knowledge and understanding of satellite based imaging systems
- Specific Outcome 14.4:** Select a remote sensor to meet specifications
- 15. Title: Plan offshore electronic positioning for hydrographic purposes**
- Specific Outcome 15.1:** Display understanding relating to offshore electronic positioning
- Specific Outcome 15.2:** Determine the applicable offshore electronic positioning technology
- Specific Outcome 15.3:** Determine the applicable offshore electronic positioning methods
- Specific Outcome 15.4:** Ensure the desired coverage and accuracy for offshore electronic positioning
- Specific Outcome 15.5:** Complete the work sequence in accordance with survey standards
- 16. Title: Control offshore electronic positioning for hydrographic purposes**
- Specific Outcome 16.1:** Display understanding related to electronic positioning
- Specific Outcome 16.2:** Manage the project plan for the implementation of offshore electronic positioning
- Specific Outcome 16.3:** determine the quality assurance and quality control mechanisms for offshore electronic positioning
- Specific Outcome 16.4:** Ensure compliance with the relevant statutory requirements for offshore electronic positioning
- Specific Outcome 16.5:** Complete the work sequence in accordance with survey standards
- 17. Title: Plan acoustic positioning for hydrographic purposes**
- Specific Outcome 17.1:** Display understanding related to acoustic positioning
- Specific Outcome 17.2:** Determine the applicable acoustic positioning technology
- Specific Outcome 17.3:** Determine the applicable acoustic positioning methods

Specific Outcome 17.4: Ensure the desired coverage and accuracy for acoustic positioning

Specific Outcome 17.5: Complete the work sequence in accordance with survey standards

18. Title: **Control acoustic positioning for hydrographic purposes**

Specific Outcome 18.1: Display understanding relating to acoustic positioning

Specific Outcome 18.2: Manage the project plan for implementation for acoustic positioning

Specific Outcome 18.3: Determine the quality assurance and quality control mechanisms for acoustic positioning

Specific outcome 18.4: Ensure compliance with relevant statutory requirements for acoustic positioning

Specific Outcome 18.5: Complete work sequence in accordance with survey standards

19. Title: **Plan a geotechnical survey for hydrographic purposes**

Specific Outcome 19.1: Determine the direction and distance apart of survey lines

Specific Outcome 19.2: Determine whether interlines or additional data are required to achieve the desired bottom coverage

Specific outcome 19.3: Capture and display the survey plan

Specific Outcome 19.4: Complete the work sequence in accordance with survey standards

20. Title: **Control a geotechnical survey for hydrographic purposes**

Specific Outcome 20.1: Manage the project plan for implementation of geotechnical surveys

Specific Outcome 20.2: Determine the quality assurance and quality control mechanisms for geotechnical surveys

Specific Outcome 20.3: Ensure compliance with relevant statutory requirements for geotechnical surveys

Specific Outcome 20.4: Complete the work sequence in accordance with survey standards

21. Title: **Collect metadata as a means to document data sets**

Specific Outcome 21.1: Display a knowledge and understanding related to the process of collecting metadata as a means to document data sets

Specific Outcome 21.2: Display a knowledge of the purpose of metadata and the differences between data and metadata

Specific Outcome 21.3: Display knowledge to determine the scope and level of information that will be included within its descriptive parameters for a metadata specification

Specific outcome 21.4: Collect and document metadata

22. Title: **Capture spatial data for GIS using single phase GPS/GNSS**

Specific Outcome 22.1: Display a knowledge and understanding relating to the capture of spatial data for GIS

Specific Outcome 22.2: Plan and prepare for the capture of spatial data in the field using a single phase GNSS

Specific outcome 22.3: Capture spatial data in the field for GIS

Specific Outcome 22.4: Complete the work sequence in accordance with standards and requirements for the task

23. Title: Compare the South African Cadastre to other cadastres

Specific Outcome 23.1: Demonstrate a knowledge and understanding of land ownership and land tenure systems

Specific Outcome 23.2: Demonstrate a knowledge and understanding of rights of land

Specific Outcome 23.3: Demonstrate a knowledge and understanding of the nature and function of a cadastre

Specific Outcome 23.4: Demonstrate a knowledge and understanding of different cadastral land boundary / survey systems

Specific Outcome 23.5: Demonstrate a knowledge and understanding of the South African cadastral system

Specific Outcome 23.6: Compare the South African cadastre to other cadastres

24. Title: Produce cartographical products according to cartographic specifications and design standards

Specific Outcome 24.1: Compile maps cartographically from the varied sources

Specific Outcome 24.2: Demonstrate a knowledge and understanding of the elements of cartographical images

Specific Outcome 24.3: Produce maps digitally

Specific Outcome 24.4: Prepare the map for printing

25. Title: Elective

Specific Outcome 25.1: Display competence in photogrammetry

Specific Outcome 25.2: Display competence in Mineral Surveying

Specific Outcome 25.3: Display Management Principles and Practice

Specific Outcome 25.4: Undertake Financial Management

Specific Outcome 25.5: Display an ability to manage projects

UNIT STANDARDS ON NQF LEVEL 7**1. Title: Design a control survey network.**

Specific Outcome 1.1: Demonstrate knowledge related to the design of control survey networks

Specific Outcome 1.2: Plan and prepare to design a control survey networks

Specific Outcome 1.3: Design a concept control survey network

Specific Outcome 1.4: Verify and present the control survey network

No. 568

10 May 2002

NATIONAL PROFESSIONAL DEGREE IN GEOMATICS

Field: Physical Planning and Construction - NSB 12
Sub-field: Physical Planning, Design and Management
Level: 7
Credit: 493

Issue date:

Review date:

Purpose:

This qualification has been developed for the surveying / geomatics occupational area. It aims, through a planned combination of unit standards, to allow a person to practise, advise, consult and supply an executive management function to survey / geomatics and land management / administration operations in any working environment, by collecting, presenting and controlling spatial data in differing formats.

This qualification has been developed to assist with professional advancement across the survey industry. This will allow persons to apply for registration as a professional-surveyor and will lay a foundation for future career advancement in surveying/geomatics.

Rationale:

As a result of past legacies many practitioners within the surveying occupational area were denied career advancement and possible registration with the professional survey council.

This was as a direct result of poor educational opportunities at some schools, leading to a lack of entry to higher education institutes. The introduction of a Professional Degree in geomatics, based on unit standards, will allow learners to reach their full potential of advancement without formal education becoming an impassable barrier and in addition, allow for the recognition of prior learning. This qualification will allow for the socio economic

empowerment of learners whilst simultaneously improving the skills base of the country and underpin the countries economic development, infrastructure, property, marine environment and mining.

Access to the qualification:

As this is a unit standard based qualification, any learner who is competent in the unit standards as required by the fundamental, core and elective components stipulated in the qualification, will have free access to this qualification.

Learning assumed to be in place:

It is assumed that a learner entering a programme leading to this qualification has achieved 360 credits obtained in the National First Degree in Geomatics or has several years relevant survey experience in the appropriate field, assessed and accredited to be the equivalent of the above first degree.

Exit level Outcomes:

On achieving this qualification a learner will be able to:

- Direct any survey operation in any working environment by performing an executive management function
- Advise and consult on a broad front in all matters relating to surveying / geomatics and land management / administration
- Set operating standards for a wide variety of advanced survey instruments, survey techniques and computer software
- Undertake research and development into surveying / geomatics techniques and instrumentation, and into land administration / management
- Investigate survey / geomatics anomalies and supply and implement corrective measures
- Evaluate raw data and confirm acceptance of complex survey/ geomatics results
- Display an understanding of advanced survey / geomatics theory required in support of outcomes
- Operate as a executive survey/ geomatics manager in individual, team or project situations with due regard to safety , legislation and norms of practice

- Communicate effectively with the world at large
- Apply a set of professional ethics and values regarding the survey discipline
- Undertake executive managerial functions while continuously monitoring and adapting own performance

Recognition of prior learning:

Any learner wish to be assessed may arrange to do so without having to attend further education or training (RPL). The assessor and learner will decide jointly on the most appropriate assessment procedures.

Articulation Possibilities:

This qualification will allow learners access to a NQF level 8 qualification based on unit standards in the survey / geomatics learning area.

With this qualification the possibility exists of being admitted to a NQF level 8 qualification offered in a higher educational institution.

This qualification has been developed for professional practice across the industry and is intended to provide professional advancement to executive management in the industry by ensuring the upliftment of the standards in general.

It is applicable to small and large business alike. This qualification builds on other certificates from a range of sub-sectors and will provide articulation with a range of qualifications in both management and service areas of practice and provide access to NQF Level 8 professional qualifications.

Criteria for assessment, moderation and provider of learning;

- Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.
- Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.
- Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQAs policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs

(including professional bodies); and in terms of the moderation guideline detailed immediately below.

- Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.
- Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution which is accredited by the relevant ETQA.

Criteria for Registration of Assessors:

For an applicant to register as an assessor, the applicant needs:

A minimum of 5 (five) years' practical, survey / geomatics occupational experience at NQF level 7 or a qualification at NQF 8 and a minimum of 3 (three) years relevant occupation experience

To be declared competent in all the outcomes of the National Assessor Unit Standards as stipulated by SAQA .

To provide detailed documentary proof of educational qualification, practical training undergone, and experience gained by the applicant (Portfolio of evidence)

Integrated Assessment:

Integrated assessment provides learners with an opportunity to display an ability to integrate practical performance, actions, concepts and theory across unit standards to achieve competence in relation to the purpose of this qualification. Assessment shall

- Measure the quality of the observed practical performance as well as the theory and underpinning knowledge behind it.
- Use methods that are varied to allow the learner to display thinking and decision making in the demonstration of practical performance.
- Maintain a balance between practical performance and theoretical assessment methods to ensure each is measured in accordance with the level of the qualification

- A learner choosing the cadastral option will be required to complete all the cadastral elective unit standards (88 credits)

International comparability:

Within the surveying/geomatics field the concept of qualifications based on unit standards is not unique to South Africa and there may be similar qualifications existing in other countries. A learner having gained this Qualification would be able to register with the South Council for Professional and Technical Surveyors and through their numerous reciprocal agreements gain international recognition.

Credit Allocation :

<u>FUNDAMENTAL</u>	<u>CORE</u>	<u>ELECTIVE</u>
30 Credits	59 Credits	44 Credits

FUNDAMENTAL

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
7	Maths, Physics and Statistics in support of the core outcome	30

CORE

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
7	Adjust and evaluate survey data	12
7	Undertake a research project of a geomatics nature	20
7	Undertake general management practice	27

ELECTIVE

NQF LEVEL	UNIT STANDARD TITLE	CREDITS
7	Provide advice regarding land ownership concepts and land tenure systems	6
7	Provide advice regarding the South African cadastral survey system	6
7	Provide advice regarding rights in land	6
7	Provide advice regarding registration matters	5
7	Provide advice regarding cadastres	2
7	Provide advice regarding different cadastral land boundary / survey systems	3
7	Investigate and interpret the Land Survey Act No 8 of 1997 and the regulations framed thereunder	5
7	Interpret and apply the Sectional Titles Act 95 of 1986 and the regulations framed thereunder	8
7	Interpret and apply legislation applicable to cadastral surveys	5
7	Apply case law precedence to cadastral matters	4
7	Source data and undertake computations required in cadastral surveys	5
7	Manage the preparation of documentation for approval by the Surveyor-General	4
7	Obtain approval for land development project	6
7	Conduct a land development project	8
	AND / OR	
7	Assure quality of offshore positioning for hydrographic purposes	8
7	Assure quality of geotechnical surveys for hydrographic purposes	8
	AND / OR	
7	Design GPS/ GNSS assisted photography	6
7	Design a vertical network according to varying terrain conditions	5
	AND / OR	
7	Investigate and analyse precise survey methods	10

7	Compensate for environmental factors that influence precise survey measurements	5
7	Compensate for the effect of angular errors on precise angle measurement	4
7	Calibrate an electronic measuring device (EDM) used for precise survey	5
	AND / OR	
7	Minerals surveying	30
	AND / OR	
7	Photogrammetry	30
	AND / OR	
7	Land administration / management / adjudication	30

UNIT STANDARDS IN PROFESSIONAL DEGREE IN GEOMATICS**UNIT STANDARDS ON NQF LEVEL 7**

- 1. Title** **Fundamental:-** Maths , Physics and statistics in support of the core outcome
- 2. Title** Adjust and evaluate survey data
- 3. Title** Undertake a research project of a geomatics nature
- 4. Title** Undertake general management practice
- 5. Title** Provide advice regarding land ownership concepts and land tenure systems
- 6. Title** Provide advice regarding the South African cadastral survey system
- 7. Title** Provide advice regarding rights in land
- 8. Title** Provide advice regarding registration matters
- 9. Title** Provide advice regarding cadastres
- 10. Title** Provide advice regarding different cadastral land boundary/survey systems
- 11. Title** Investigate and interpret the land survey Act no 8 of 1997 and the regulations framed thereunder
- 12. Title** Interpret and apply the sectional titles Act 95 of 1986 and the regulations framed thereunder
- 13. Title** Interpret and apply legislation applicable to cadastral surveys
- 14. Title** Apply case law precedence to cadastral matters
- 15. Title** Source data and undertake computations required in cadastral surveys
- 16. Title** Manage the preparation of documentation for approval by the Survey General
- 17. Title** Obtain approval for land development project
- 18. Title** Conduct a land development project
- 19. Title** Assure quality of offshore positioning for hydrographic purposes
- 20. Title** Assure quality of geotechnical surveys for hydrographic purposes
- 21. Title** Design GPS/ GNSS assisted photography
- 22. Title** Design a vertical network according to varying terrain conditions
- 23. Title** Investigate and analyse precise survey methods
- 24. Title** Compensate for environmental factors that influence precise survey measurements
- 25. Title** Compensate for the effect of angular errors on precise angle measurements
- 26. Title** Calibrate an electronic measuring device (EDM) used for precise survey

- 27. Title** **Elective:- Display competence in Minerals Surveying and/or photogrammetry and / or land administration / management/ adjudication**

UNIT STANDARDS AND OUTCOMES IN PROFESSIONAL DEGREE IN GEOMATICS

UNIT STANDARDS ON NQF LEVEL 7

- 1. Title** **Fundamental in support of Core competency**

- Specific Outcome 1.1.** Maths
Specific Outcome 1.2 Physics
Specific Outcome 1.3 Statistics

- 2. Title:** **Adjust and evaluate survey data**

- Specific Outcome 2.1:** Demonstrate knowledge and understanding of the adjustment and evaluation of survey data
Specific Outcome 2.2: Plan and prepare to adjust and evaluate survey data
Specific Outcome 2.3: Adjust and evaluate survey data

- 3. Title** **Undertake a research project of a geomatics nature**

- Specific Outcome 3.1:** Select an appropriate topic and outline the method of research
Specific Outcome 3.2: Undertake research and investigation into topic
Specific Outcome 3.3: Catalogue all relevant research and investigate findings
Specific Outcome 3.4: Present such research both in written and oral form

- 4. Title** **Undertake general management practice**

- Specific Outcome 4.1:** Demonstrate management principles
Specific Outcome 4.2: Undertake general management practice
Specific Outcome 4.3: Undertake financial management
Specific Outcome 4.4: Undertake management of projects

- 5. Title:** **Provide advice regarding land ownership concepts and land tenure systems**

- Specific Outcome 5.1:** Investigate , analyse and describe concepts of ownership
Specific Outcome 5.2: Investigate, analyse and describe the methods of acquiring ownership of land

- Specific Outcome 5.3:** Investigate, analyse and describe different types of land tenure
- Specific Outcome 5.4:** Advise on land ownership concepts and land tenure systems

6. Title: Provide advice regarding the South African cadastral survey system

- Specific Outcome 6.1:** Investigate and analyse the historical evolution of cadastral surveying in South Africa
- Specific Outcome 6.2:** Demonstrate knowledge and understanding of boundaries and beacons as used in the South African Survey system
- Specific Outcome 6.3:** Demonstrate knowledge and understanding of the cadastral process and the responsibilities of role players
- Specific Outcome 6.4:** Investigate and analyse various ways in which cadastral data have been and are represented for the purpose of registration in a deeds registry
- Specific Outcome 6.5:** Advise on the necessity of a cadastral system within South Africa, the benefits and requirements thereof

7. Title: Provide advice regarding rights in land

- Specific Outcome 7.1:** Investigate and explain the concepts of real and personal rights, and of registerable and non-registerable rights
- Specific Outcome 7.2:** Demonstrate knowledge of the different types of rights in land
- Specific Outcome 7.3:** Investigate and explain the concept and purpose of servitudes, both praedial and personal.
- Specific Outcome 7.4:** Demonstrate knowledge and understanding of the different types of servitudes
- Specific Outcome 7.5:** Demonstrate knowledge and understanding of the different types of leases
- Specific Outcome 7.6:** Advise on the various types of rights applicable or potentially applicable to a specific land parcel

8. Title: Provide advice regarding registration matters

- Specific Outcome 8.1:** Investigate and explain the purpose and attributes of a land registration system
- Specific Outcome 8.2:** Demonstrate knowledge of land registration systems as used around the world

- Specific Outcome 8.3:** Demonstrate knowledge and understanding of current legislation relating to South African Land registration
- Specific Outcome 8.4:** Investigate and explain the role of the conveyancer in the process of transfer of rights in land
- Specific Outcome 8.5:** Advise on the registration procedure relating to a given situation

9. Title: Provide advice regarding cadastres

- Specific Outcome 9.1:** Define a cadastre
- Specific Outcome 9.2:** Analyse the purpose and function of a cadastre
- Specific Outcome 9.3:** Analyse the attributes of a cadastre
- Specific Outcome 9.4:** Advise on the need for a cadastre, the characteristics and benefits thereof

10. Title: Provide advice regarding different cadastral land boundary / survey systems

- Specific Outcome 10.1:** Analyse different attributes of cadastral survey systems throughout the world
- Specific Outcome 10.2:** Outline the advantages and disadvantages of different cadastral boundary systems
- Specific Outcome 10.3:** Analyse land boundary systems
- Specific Outcome 10.4:** Outline problems pertaining to cadastral systems
- Specific Outcome 10.5:** Advise on the characteristics, advantages and disadvantages of a land boundary / survey system

11 Title: Investigate and interpret the Land Survey Act No.8 of 1997 and the regulations framed thereunder

- Specific Outcome 11.1:** Interpret the purpose of the Land Survey Act No.8 of 1997
- Specific Outcome 11.2:** Investigate the purpose of the regulations framed under the Land Survey Act No.8 of 1997
- Specific Outcome 11.3:** Investigate and interpret provisions of the Land Survey Act No. 8 of 1997
- Specific Outcome 11.4:** Investigate and Interpret provisions of the current regulations framed under the Land Survey Act No.8 of 1997

12 Title : Interpret and apply the sectional titles ACT No 95 OF 1986 and the regulations framed thereunder

Specific Outcome 12.1: Interpret the purpose of the sectional titles Act 95 of 1986

Specific Outcome 12.2: Investigate the purpose behind the sectional titles regulations

Specific Outcome 12.3: Investigate and apply the sectional titles Act 95 of 1986 and regulations framed thereunder

13 Title: Interpret and apply legislation applicable to cadastral surveys

Specific Outcome 13.1: Interpret and apply relevant legislation that effects a cadastral assignment

Specific Outcome 13.2: Describe and explain the purpose and relevance of such legislation to land ownership and cadastral surveying

Specific Outcome 13.3: Interpret, describe and explain the consequence of non-compliance with relevant statutes applicable to land ownership and cadastral surveys

14 Title: Apply case law precedence to cadastral matters

Specific Outcome 14.1: Identify and collect records of court cases applicable to cadastral survey problems

Specific Outcome 14.2: Explain the relevance of case law in relation to the land survey Act No 8 of 1997

Specific Outcome 14.3: Read extract and apply principles from each case law in its relevance to cadastre

15. Title : Source data and undertake computations required in a cadastral survey

- Specific Outcome 15.1:** Identify and obtain necessary documentation and other evidence prior to a cadastral survey
- Specific Outcome 15.2:** Evaluate the evidence and determine its applicability to a cadastral survey
- Specific Outcome 15.3:** Perform calculations necessary for the purpose of the cadastral survey
- Specific Outcome 15.4:** Compare the results of the survey data with the original data for the purpose of reconstruction of beacons and boundaries
- Specific Outcome 15.5:** Calculate final data

16 Title : Manage the preparation of documentation for the approval by the Surveyor General

- Specific Outcome 16.1:** Recognise the responsibilities of the Surveyor General regarding the approval of documentation
- Specific Outcome 16.2:** Obtain the statutory consents required for approval and registration purposes
- Specific Outcome 16.3:** Manage the compilation of the necessary submissions in support of the diagram, general plan and draft sectional plan
- Specific Outcome 16.4:** Manage the preparation of a diagram, general plan and draft sectional plan
- Specific Outcome 16.5:** Recognise the responsibilities of signing the relevant documentation inherent in the cadastral survey

17 Title: Obtain approval for land development project

- Specific Outcome 17.1:** Investigate and establish the scope of a land development project
- Specific Outcome 17.2:** Prepare an application together with supporting documentation for submission to the relevant local authority
- Specific outcome 17.3:** Follow the application through from submission to local authority approval.
- Specific Outcome 17.4:** Prepare for implementation of the cadastral survey process

18. Title: Conduct a land development project

- Specific Outcome 18.1:** Investigate and establish the scope of a land development project
- Specific Outcome 18.2:** Plan the management process for the land development project
- Specific Outcome 18.3:** Manage the implementation process
- Specific Outcome 18.4:** Deliver the project

19. Title: Assure quality of offshore positioning for hydrographic purposes

- Specific Outcome 19.1:** Display a knowledge and understanding relating to quality of offshore positioning
- Specific Outcome 19.2:** Identify the appropriate positioning technology
- Specific Outcome 19.3:** Identify the appropriate positioning systems
- Specific Outcome 19.3:** Identify requirements for statutory compliance
- Specific Outcome 19.4:** Complete the work sequence in accordance with survey standards

20. Title: Assure quality of geotechnical surveys for hydrographic purposes

- Specific Outcome 20.1:** Display knowledge and understanding relating to geotechnical surveys
- Specific Outcome 20.2:** Identify the appropriate geotechnical survey technology
- Specific Outcome 20.3:** Identify the appropriate geotechnical survey systems
- Specific Outcome 20.4:** Identify requirements for statutory requirements
- Specific Outcome 20.5:** Complete the work sequence in accordance with survey standards

21. Title: Design GPS / GNSS assisted photography

- Specific Outcome 21.1:** Design position of flight lines including cross strips for GPS / GNSS photography
- Specific Outcome 21.2:** Determine the position of ground control points and accuracy of XYZ fixes
- Specific Outcome 21.3:** Site GPS /GNSS based station and survey the required position to necessary accuracy in XYZ
- Specific Outcome 21.4:** Determine the time interval between GPS / GNSS fixes required for project specific requirements
- Specific Outcome 21.5:** Establish offset between antennae and projection centre of aerial camera

22. Title: Design a vertical network according to varying terrain conditions

- Specific Outcome 22.1:** Demonstrate knowledge of vertical datums as a reference surface for heighting networks
- Specific Outcome 22.2:** Demonstrate knowledge of the errors associated with trigonometrical levelling, precise levelling and GPS levelling
- Specific Outcome 22.3:** Convert geopotential differences to orthometric, normal and dynamic height differences
- Specific Outcome 22.4:** Design a vertical network using the techniques of trigonometrical levelling, precise levelling, and GPS levelling over varying terrain conditions

23. Title: Investigate and analyse precise survey methods

- Specific Outcome 23.1:** Demonstrate knowledge and understanding of accuracy requirements
- Specific Outcome 23.2:** Demonstrate knowledge and understanding of precise survey instrumentation
- Specific Outcome 23.3:** Demonstrate knowledge and understanding of monumentation
- Specific Outcome 23.4:** Demonstrate knowledge and understanding of deflation monitoring surveys
- Specific Outcome 23.5:** Investigate and analyse precise positioning surveys

24. Title: Compensate for environmental factors that influence precise survey measurements

Specific Outcome 24.1: Compensate for the effects of electromagnetic radiation on precise survey measurements

Specific Outcome 24.2: Compensate for the effects of curvature of the light path on precise survey measurements

Specific Outcome 24.3: Compensate for the effects of refraction on GPS / GNSS measurements

25. Title Compensate for the effects of angular errors on precise angle measurements

Specific Outcome 25.1: Compensate for the effects of theodolite errors on precise angle measurement

Specific Outcome 25.2: Compensate for the effects of centring errors on precise angle measurement

Specific Outcome 25.3: Complete the work sequence in accordance with survey standards

26. Title: Calibrate an electronic measuring device (EDM) used for precise survey

Specific Outcome 26.1: Display knowledge and understanding of systematic errors and EDM calibration

Specific Outcome 26.2: Display knowledge and understanding of reductions applied to EDM distances

Specific Outcome 26.3: Calibrate an EDM device

27. Title: Elective

Specific Outcome 27.1: Undertake Mineral Surveying

Specific Outcome 27.2: Undertake photogrammetry

Specific Outcome 27.3: Undertake Land Administration/ Management / Adjudication

Printed by and obtainable from the Government Printer, Bosman Street, Private Bag X85, Pretoria, 0001

Publications: Tel: (012) 334-4508, 334-4509, 334-4510

Advertisements: Tel: (012) 334-4673, 334-4674, 334-4504

Subscriptions: Tel: (012) 334-4735, 334-4736, 334-4737

Cape Town Branch: Tel: (021) 465-7531

Gedruk deur en verkrygbaar by die Staatsdrukker, Bosmanstraat, Privaatsak X85, Pretoria, 0001

Publikasies: Tel: (012) 334-4508, 334-4509, 334-4510

Advertensies: Tel: (012) 334-4673, 334-4674, 334-4504

Subskripsies: Tel: (012) 334-4735, 334-4736, 334-4737

Kaapstad-tak: Tel: (021) 465-7531